the present invention in any way to such theory, mechanism of operation, proof, or finding. In reading the claims, words such as "a", "an", "at least one", and "at least a portion" are not intended to limit the claims to only one item unless specifically stated to the contrary. Further, when the language "at least a portion" and/or "a portion" is used, the claims may include a portion and/or the entire item unless specifically stated to the contrary.

What is claimed is:

1. A method for determining a fluid property comprising:

delivering an ultrasound pulse to a member with a transducer, the member being comprised of a solid material and including a first surface opposite a second surface, the first surface being coupled to the transducer and the second surface being in contact with a fluid, the ultrasound pulse reflecting between the first surface and the second surface to provide an ultrasound pulse echo series;

detecting a multiplicity of the ultrasound pulse echoes of the echo series with the transducer;

determining a first value from the multiplicity of the ultrasound pulse echoes, the first value corresponding to an average decay rate of the multiplicity of the ultrasound pulse echoes;

determining a second value corresponding to an acoustic property of the fluid from the first value and an established calibration value;

determining a third value corresponding to speed of ultrasound in the fluid; and

determining a physical property of the fluid as a function of the second and third values.

2. The method of claim **1** wherein the transducer produces the ultrasonic pulse in response to a first voltage input from a pulser and wherein the second value is determined without correcting the second value by more than about 2% for any difference in the first voltage input from a second voltage input to a transducer used in selecting the established calibration value.

3. The method of claim **2** wherein the first voltage input to the transducer is non-sinusoidal and has a duration less than a half cycle at the center frequency of the transducer.

4. The method of claim **1** wherein the transducer has a face associated with the first surface and the distance between the first surface and the second surface of the member is less than the largest dimension of the transducer face.

5. The method of claim **1** further comprising:

identifying a wall of a fluid conduit or container containing the fluid to provide the member; and

coupling the transducer to a portion of the identified wall to provide a retrofit sensing apparatus.

6. The method of claim **5** wherein the wall is stainless steel.

7. The method of claim **1** wherein the ultrasonic pulse is a longitudinal wave and the physical property is fluid density.

8. The method of claim **1** wherein the ultrasonic pulse is a shear wave and the physical property is selected from the group consisting of viscosity, shear modulus, and shear speed.

9. The method of claim **1** wherein an ultrasonic shear wave transducer and an ultrasonic longitudinal wave transducer are each provided and wherein fluid density and a property selected from the group consisting of viscosity, shear modulus, and shear speed are determined.

10. The method of claim **1** wherein the third value is determined by performing a measurement on the fluid.

11. The method of claim **10** wherein the third value is determined by performing a time-of-flight measurement at a frequency below the operational frequency of the transducer.

12. The method of claim **1** wherein the multiplicity of the ultrasound pulse echoes are non-sequential echoes from the echo series.

13. A method for determining a fluid property comprising:

providing a wall having opposed first and second surfaces, an ultrasonic transducer in association with the first surface, and a fluid in contact the second surface;

wherein the transducer has a face associated with the first surface and the distance between the first and second surfaces of the wall is less than the largest dimension of the transducer face;

delivering a pulse of ultrasound to the wall with the transducer, wherein the ultrasound pulse reflects between the first and second surfaces to provide an ultrasound pulse echo series;

detecting a plurality of the ultrasound pulse echoes of the echo series with the transducer;

determining a first value from the plurality of the ultrasound pulse echoes, the first value corresponding to an average decay rate of the plurality of the ultrasound pulse echoes; and

determining a second value corresponding to an acoustic property of the fluid from the first value and an established calibration value.

14. The method of claim further comprising:

determining a third value corresponding to speed of ultrasound in the fluid; and

determining a physical property of the fluid as a function of the second and third values.

15. The method of claim wherein the transducer produces the ultrasonic pulse in response to a first voltage input from a pulser and wherein the second value is determined without correcting the second value by more than about 2% for any difference in the first voltage input from a second voltage input to a transducer used in selecting the established calibration value.

16. The method of claim **13** further comprising:

identifying a wall of a fluid conduit or container containing the fluid to provide the member; and

coupling the transducer to a portion of the identified wall to provide a retrofit sensing apparatus.

17. The method of claim **13** wherein the wall is stainless steel.

18. The method of claim **13** wherein an ultrasonic shear wave transducer and an ultrasonic longitudinal wave transducer are each provided and wherein the fluid density and a property selected from the group consisting of viscosity, shear modulus, and shear speed are determined.

19. The method of claim **13** wherein the third value is determined by performing a time-of-flight measurement at a frequency below the operational frequency of the transducer.

20. A method for determining a fluid properly comprising:

providing a fluid in contact with an inner surface of a wall;

providing an ultrasonic transducer in association with an opposed surface of the wall;

delivering a pulse of ultrasound to the wall with the transducer by providing a non-sinusoidal stimulus to the transducer, wherein the ultrasound pulse reflects between the inner and opposed surfaces to provide an ultrasound pulse echo series at the transducer

detecting a plurality of the ultrasound pulse echoes of the echo series with the transducer;

determining a first value from the plurality of the ultrasound pulse echoes corresponding to a decay rate of the plurality of the ultrasound pulse echoes by selecting a